

What is claimed is:

1. A microsample manipulator, comprising:

a shaft having a proximal end and a distal end;

5 a microsample holder coupled to the distal end; and

a support arm coupled to the shaft having a retracted position and a deployed position, wherein the microsample holder is at least partially supported when the support arm is deployed.

10 2. The microsample manipulator of claim 1, wherein the microsample holder is at least substantially accessible when the support arm is retracted.

3. The microsample manipulator of claim 1, wherein the microsample holder is removably coupled to the distal end.

15 4. The microsample manipulator of claim 1, wherein the support arm is configured to permit analysis of a microsample in associated with the microsample holder when the support arm is deployed.

20 5. The microsample manipulator of claim 4, wherein the support arm includes an aperture aligned with at least a portion of the microsample holder when the support arm is deployed.

6. The microsample manipulator of claim 1, wherein the support arm may be deployed by one or more of sliding, rotating, and pivoting.

7. The microsample manipulator of claim 1, wherein the microsample holder  
5 includes a microsample platform and a clamp configured to reversibly affix the microsample platform to the shaft.

8. The microsample manipulator of claim 7, wherein the microsample platform is substantially planar.

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9. The microsample manipulator of claim 7, wherein the microsample platform includes a grid.

10. The microsample manipulator of claim 7, wherein the microsample  
15 platform includes a disk having a diameter of about 3 mm.

11. The microsample manipulator of claim 10, wherein the microsample platform further includes a sample tip extending from the disk.

20 12. The microsample manipulator of claim 11, wherein the disk includes an aperture, and the sample tip is configured to be folded toward the disk to bring the sample tip into alignment with the aperture.

13. A sample manipulation system, comprising:

a microsample manipulator that includes a shaft having a proximal end and a distal end, a planar microsample platform affixed to the distal end, and a support arm coupled to the shaft having a retracted position and a deployed position; and

5 a housing at least substantially enclosing the microsample manipulator, wherein the housing permits access to the microsample platform.

14. The sample manipulation system of claim 13, wherein the housing includes one or more mechanisms for manipulating the position or orientation of the  
10 microsample platform.

15. The sample manipulation system of claim 13, wherein the housing includes a vacuum valve configured to evacuate at least a portion of the housing when the microsample manipulator is inserted into the housing.

16. The sample manipulation system of claim 13, wherein the sample manipulation system includes one or more of tools, instruments, and detectors.

17. A microsample manipulator, comprising:

20 a shaft having a proximal end and a distal end; and

a microsample holder removably coupled to the distal end;

wherein the microsample holder is configured to be coupled to a plurality of distinct microsample manipulators.

18. The microsample manipulator of claim 17, wherein the microsample manipulator includes a support arm coupled to the shaft having a retracted position and a deployed position, wherein the support provides selective accessibility to the microsample holder.

19. The microsample manipulator of claim 17, wherein the microsample holder is axially removable from the shaft.

20. The microsample manipulator of claim 18, wherein the microsample holder is coupled via insertion of a portion of the microsample holder into a recess in the distal end of the shaft.

21. A method of using a microsample manipulator that includes a shaft having a proximal end and a distal end, a microsample holder affixed to the distal end, and a support arm coupled to the shaft having a retracted position and a deployed position; comprising:

associating a microsample with the microsample holder; and

deploying the support arm to at least partially support the microsample holder.

22. The method of claim 21, further comprising transporting the microsample to an analytical instrument.

23. The method of claim 22, further comprising inserting the microsample into the analytical instrument.

24. The method of claim 23, further comprising analyzing the microsample  
5 using the analytical instrument.

25. The method of claim 24, wherein the analytical instrument is a transmission electron microscope.

10 26. The method of claim 23, further comprising retracting the support arm before inserting the microsample into the analytical instrument.

27. The method of claim 21, wherein the microsample is associated with the sample holder using a focused ion beam instrument.

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